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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/070,286	07/08/2002	Hubert Benzel	10191/2262	3055

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EXAMINER	
ALANKO, ANITA KAREN	

ART UNIT	PAPER NUMBER
1765	

DATE MAILED: 02/24/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/070,286	BENZEL ET AL.	
	Examiner	Art Unit	
	Anita K Alanko	1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12/3/04 amdt*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *16-20,22,24-42 and 46-51* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *16-20,22,24-42 and 46-51* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☒ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☒ Interview Summary (PTO-413) Paper No(s)/Mail Date. *0205* .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Priority

Acknowledgment is made of applicant's claim for foreign priority based on an application filed in Germany on 7/5/00. It is noted, however, that the Office has not received a certified copy of the foreign application.

Specification

The disclosure is objected to because of the following informalities: On page 13, line 28, it appears that "criterium" should recite - - criterion - - , and that on page 15, line 31, "with -type doping" should recite - - with n-type doping - - .

Appropriate correction is required.

Claim Objections

Claims 16-20, 22, 24-42, 46-51 are objected to because of the following informalities: where the term "one of" occurs it appears that a Markush group is being claimed. If so, then the claims should cite "selected from the group consisting of". Otherwise, for example, the claim can be read such that "one of a hollow and a cavity" is just that- a combination of both a hollow and a cavity. In claim 16 and claim 46, the term "etching step with a porosity of 100%" is not clearly defined in the specification. When would etching not have a porosity of 100%? Also in claim 39, it appears that the high-temperature step is part of the annealing step, if so, then the claim should be amended so that the term has proper antecedent basis. Claim 35 depends from a cancelled claim. It appears that it should depend from claim 17 in order to have proper antecedent basis for the term "semiconductor element". Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 16-18, 20, 22, 24-26, 35-42, 46-51 are rejected under 35 U.S.C. 102(e) as being anticipated by Tu (US 6,359,276 B1).

Tu discloses a method of producing a semiconductor component having a semiconductor substrate and a semiconductor component made by the method comprising the steps of:

producing a first porous layer 212 in the semiconductor component 201; and

producing one of a hollow and a cavity 223 in the semiconductor component under the first porous layer;

wherein the one of the hollow and the cavity producing step includes the substep of producing a second porous layer 220 having a porosity of more than approximately 70% (inherent since the same HF method is used as in the instant invention, the same result of porosity is expected) under the first porous layer, and

wherein the one of the hollow and the cavity is produced in the one of the hollow and the cavity producing step from the second porous layer by an an etching step with a porosity of 100% (col.7, lines 17-27).

Col.5, lines 38-42:

porosity of about 70%. The anodization is restricted in the p-well **203** region and only to convert the upper layer of the p-well **203** region into porous silicon layer **212** having a thickness of 4–6 μ, as shown in FIG. **3**.

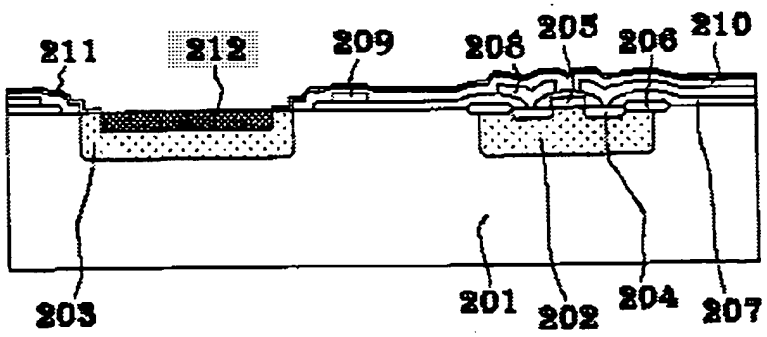

FIG. 3

Col.6, line 63-col.7, line 5:

The eighth fabrication step is to perform a second anodization of the Si substrate **201** in a HF solution. The anodization conditions to be used are the same as used above. Under no light illumination, the anodization reaction is restricted to the inside of the p-well **203** region. As soon as the lower layer of the p-well **203** region converts into a porous silicon layer **220**, the anodization reaction stops automatically. No n-type silicon of the substrate **201** is attacked during the anodization process. The resulted structure is shown in FIG. **9**.

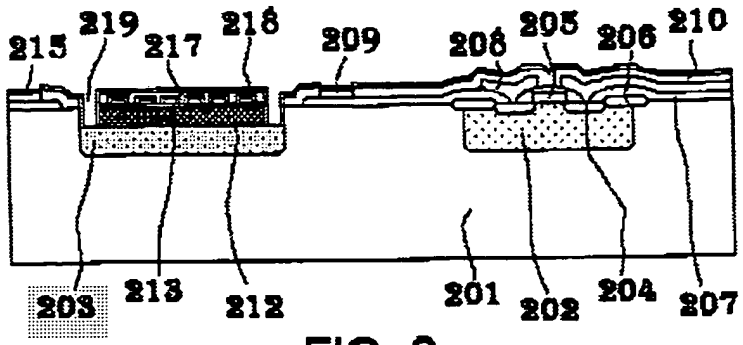

FIG. 8

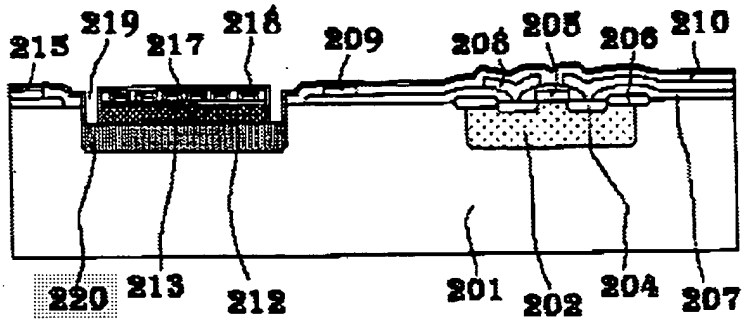

FIG. 9

Col.7, lines 17-27:

The eleventh fabrication step is to remove the porous silicon layer **209** in the p-well **203** region. The etchant to be used is a KOH solution of 1–3 w %. The etchant can not attack the porous silicon layer **211** immediately since the surface of the inner pores of the porous silicon **211** is coated with a thin SiO_2 or Si_3N_4 film. The etchant can also not attack the silicon of the Si substrate **201** since the KOH solution is diluted and the etching is performed at room temperature. After the etching, a cavity **223**, a porous silicon membrane **224**, and four porous silicon beams **225** are formed, as shown in FIG. **12**.

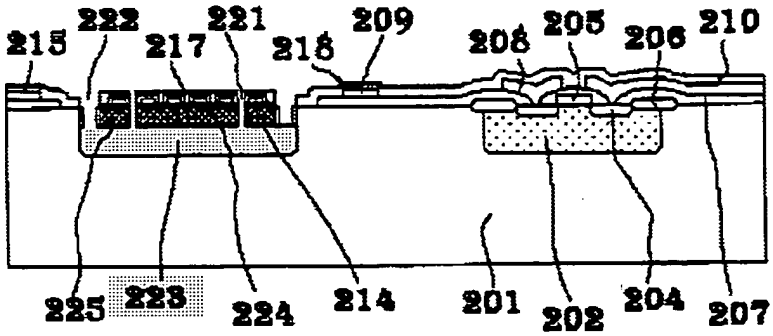

FIG. 12

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 16-20, 22, 24-28, 35-42, 46-51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seefeldt et al (US 5,834,333).

Seefeldt discloses a method and a semiconductor component made by the method comprising:

producing a first porous layer in the semiconductor component (col.5, lines 55-56); and

producing a cavity 22 in the semiconductor component from the first porous layer, the cavity configured to be provided with an external access opening (in order to be etched; col.5 lines 40-col.6, line 11).

Seefeldt discloses to form multiple porous layers 204, and 212 and 216 (col.5, lines 55-56). Seefeldt does not disclose the degree of porosity. However, since they are at different levels in the substrate (Fig.8), it is expected that they have different porosities. It is expected that the degree of porosity effects the efficiency of their later removal by etching. It would have been obvious to one with ordinary skill in the art to vary the porosity to the degree cited because the porosity appears to reflect a result-effective variable which can be optimized. See MPEP 2144.05 IIB.

As to claims 17-19, Seefeldt discloses to form a pressure sensor, which also has multilayer semiconductor elements ("integrated circuitry") in order to operate the sensor (col.3, lines 31-47).

As to claim 20, Seefeldt discloses that the wafer includes silicon (col.3, line 49).

As to claim 22, see the rejection above. It would have been obvious to one with ordinary skill in the art to vary the porosity to the degree cited because the porosity appears to reflect a result-effective variable which can be optimized. See MPEP 2144.05 IIB.

As to claims 24-27, Seefeldt discloses to form multiple porous layers 204, and 212 and 216 (col.5, lines 55-56), which are removed by access openings in one side (col.6, lines 3-4).

As to claim 28, Seefeldt discloses to use HF (col.9, line 45).

As to claim 35, Seefeldt discloses to apply an electrical field (col.8, lines 3-5).

As to claims 36-37, the method of forming the cavity in Seefeldt encompasses the expansion rates and overlapping hollows cited in order to form the hollow.

As to claim 38, it would have been obvious to change the current density, concentration, additive in the etching medium or temperature in the method of Seefeldt in order to optimize the process for best results.

As to claim 39, Seefeldt discloses to have a high-temperature step (col.9, lines 65+).

As to claims 40-42, Seefeldt discloses to form a beam of polysilicon, however it would have been obvious to form a siliocon epitaxial layer since they are both formed from the same material, silicon.

Claims 16-20, 22, 24-42 and 46-51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seefeldt et al (US 5,834,333) in view of Brendel (US 2003/0017712 A1).

The discussion of Seefeldt from above is repeated here.

As to claims 29-34 and 38, Seefeldt does not disclose to add an additive to the HF etchant. Brendel teaches that it is useful to add ethanol in the concentration cited to HF for etching of porous silicon (paragraph [0132]). It would have been obvious to add ethanol to the etchant in the method of Seefeldt because Brendel teaches that it is a useful additive for etchants.

Claims 16-20, 22, 24-26, 35-42, and 46-51 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Tu (US 6,359,276 B1) and Seefeldt et al (US 5,834,333).

The discussion of Tu from above is repeated here.

As to claim 19, Tu is directed to a microbolometer, not a pressure sensor. However, Seefeldt teaches that micromachines such as pressure sensors are well known. It would have

been obvious to one with ordinary skill in the art to use the method of Tu to form a pressure sensor as taught by Seefeldt because Tu teaches a useful method for forming released beams.

Claims 16-18, 20, 22, 24-42 and 46-51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tu (US 6,359,276 B1) in view of Brendel (US 2003/0017712 A1).

The discussion of Tu from above is repeated here.

As to claims 29-34 and 38, Tu does not disclose to add an additive to the HF etchant. Brendel teaches that it is useful to add ethanol in the concentration cited to HF for etching of porous silicon (paragraph [0132]). It would have been obvious to add ethanol to the etchant in the method of Tu because Brendel teaches that it is a useful additive for etchants.

Response to Arguments

Applicant's arguments filed 12/3/04 have been fully considered but they are not persuasive. Applicant's arguments are not commensurate in scope with the claim language. The claims are not limited to annealing, as in the previously allowed claim over the prior art, claim 21. Rather, the claim cites forming the hollow by etching or annealing. Tu also discloses etching as discussed above in the rejections. The allowability of claim 36 is withdrawn, as the examiner misinterpreted the meaning of expansion rates. Tu and Seefeldt inherently comprise expansion rates in order to form the hollow.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anita K Alanko whose telephone number is 571-272-1458. The examiner can normally be reached on Mon-Fri until 2:30 pm (Wed until 11:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571-272-1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Anita K. Alanko

Anita K Alanko
Primary Examiner
Art Unit 1765